REMARKS

Claims 1-6 are presently pending in the application.

Claim 1 has been amended to incorporate the subject matter from claim 8, now canceled. No new matter has been added by this amendment and entry is respectfully requested.

The Examiner has finally rejected claims 1-6 and 8 under 35 U.S.C. § 102(b) or under § 103(a) as being anticipated by or obvious over U.S. Patent No. 3,409,542 of Molstedt ("Molstedt"). Briefly, the Examiner again argues that Molstedt discloses a process of discharging and transferring upwardly fluidized particles from a dense fluidized layer forming section to an upper section having a diameter that is smaller than the dense fluidized layer forming section, wherein an intermediate cylindrical section (cone) is provided between the dense fluidized forming section and the upper section. Molstedt allegedly teaches that the intermediate section has truncated cone ends connected to the dense fluidized layer forming section and said upper section, respectively, the former having an elevation angle of 60°.

The Examiner acknowledges that Molstedt does not specifically disclose that the intermediate section is a cylindrical section. However, the Examiner argues that it appears that the intermediate cone section of Molstedt is a special type of cylinder and contends that the "cylindrical" limitation is taught by the reference. Alternatively, the Examiner contends that it would have been obvious to one having ordinary skill in the art at the time of the invention to have modified the process of Molstedt by using an intermediate cylindrical section as claimed because it would have been expected that, in the process of Molstedt, the results would be the same or similar when using either the claimed section or the Molstedt section because both sections would result in increasing velocity of the gas as it proceeds upwards.

Regarding claim 8, the Examiner acknowledges that Molstedt does not disclose that the intermediate cylindrical section has an elevation of 85° or greater, but contends that it would have been obvious to one having ordinary skill in the art at the time of the invention to have modified the process of Molstedt by using such an intermediate section because the gas velocity would be the same or similar when using either a shorter-pipe intermediate section with an elevation angle of about less than 85° or a longer pipe intermediate section with an elevation angle of 85° or greater.

In response to Applicants' previous conclusion that the results described at page 13 of the specification demonstrate that the apparatus comprising an intermediate section is superior, the

Examiner contends that these results are not persuasive because Molstedt teaches the intermediate section. Applicants respectfully traverse these rejections and the arguments in support thereof as follows for the reasons set forth previously on the record, which Applicants rely upon in full, and for the additional reasons which follow, and respectfully request reconsideration and withdrawal of the rejections.

Initially, Applicants respectfully submit that a § 102(b) rejection is no longer appropriate in view of the present amendment, since Molstedt does not teach or suggest an elevation angle of 85° of greater. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested. Applicants further submit that the present claims are also not obvious over Molstedt as follows.

As previously explained and described in the Background section of the present application (see page 7, lines 4-17), in the surface of the dense fluidizing layer in fluid catalytic cracking (FCC) devices, clusters of particles jump from the surface when bubbles rising through the layer rupture. The clusters then break up, and part of the cluster descends and part rises. In a relatively short freeboard (upper space), as in traditional devices, the clusters cannot break up completely, even if the upper portion of the dense fluidizing layer forming section is formed into a truncated cone. Therefore, clusters can pass through the upper portion and reach the high velocity transferring section. As a result, the amount of transferred particles varies and pressure loss occurs.

In contrast, according to the present invention, an apparatus used in a process of discharging and transferring fluidized particles contains an intermediate section having an elevation angle of 85° or greater which is provided between the dense fluidizing layer forming section (the reactor) and the high-velocity transferring section (the riser). In a structure with such an intermediate cylindrical section, the rising rate of a mixture of fluidizing gas and particles (catalyst) is relatively less than that through a tapered section. Accordingly, the residence time of the mixture in the section becomes longer and the clusters of the particles (catalysts) which have been generated in the reactor can fully break up while rising through the section, so that the particles are uniformly dispersed in and rise uniformly with the fluidizing gas. Therefore, use of the apparatus in the claimed method decreases variations in the quantities of particles to be discharged from the reactor and transferred to the riser, as well as changes of pressure in the riser, making it possible to smoothly and stably transfer the particles through the system without clogging the cyclone separator or the particle down-flow circulating line.

The advantageous effects of the present invention obtained by employing the specifically designed intermediate cylindrical section are specifically shown in the Example at pages 11- 13 of the specification. In this experiment, the intermediate cylindrical section (13) has a completely cylindrical shape (elevation angle 90°) and a diameter of 2.6 cm (Dp). The experimental results show that the average pressure change in the riser was small (ΔP_R = 78.4 Pa (8 mmaq)) and that the observed particles in the riser were uniformly dispersed into the gas and rose through the riser, so that the particles circulated smoothly from the separator (16) to the particle-down-flow circulating line (17) without clogging.

The Examiner asserts that it would have been obvious to use an intermediate cylindrical section as claimed in the Molstedt apparatus because it would have been expected that the claimed section and Molstedt section would produce similar results. To the contrary, Applicants have found that the average pressure changes observed in the riser portion (ΔP_R) in the apparatuses used in the claimed and Molstedt proceses, which are indicative of the changes of the densities of the particles transferred through each apparatus, are dramatically different.

As described in the enclosed Declaration Under 37 C.F.R.§ 1.132 of Yuichiro Fujiyama ("Fujiyama Declaration"), a comparative experiment was performed in order to compare the inventive and Molstedt methods. The results which were obtained demonstrate that the use of the specific apparatus in the claimed method, having a cylindrical section with an elevation angle of at least 85°, provides unexpected results relative to the Molstedt apparatus, having a tapered section with an elevation angle of less than 85°.

As described in detail in the Fujiyama Declaration, Applicants prepared the inventive apparatus (depicted in the diagram attached to the Declaration), in which the intermediate section has a completely cylindrical shape (an elevation angle of 90°). It is noted that while the present invention is directed to a process and there is no "inventive apparatus" *per se*, it is easier to graphically depict an apparatus than a method, and thus the Fujiyama Declaration and accompanying diagram refer to the "inventive apparatus." Thus term may be understood to mean the apparatus which is used in the inventive method.

An apparatus as described by Molstedt was also prepared, in which the intermediate section has a truncated cone shape (elevation angle of 70°), less than the claimed elevation angle of at least 85°. Each design contains a prism (rectangular column) section and a truncated pyramid section each having a 1.6 cm thickness, aside from the riser (a cylinder having a 1.1 cm

diameter). The experimental conditions which were utilized are summarized at page 3 of the Fujiyama Declaration.

In order to evaluate each method, the pressure losses and pressure changes in the riser portions were measured to determine the changes in the densities of the particles transferred through each apparatus. It was observed that the average pressure change in the riser (ΔP_R) of the apparatus used in the inventive method was **181.5 Pa**, whereas the comparative (Molstedt) apparatus yielded a dramatically larger pressure change of **330 Pa**. In both cases, the average transferred amount of particles was 0.06 kg/s.

It was also observed that in the Molstedt apparatus, clusters of the particles were transferred to the lower portion of the riser as they were, since the truncated cone did not allow them to break up sufficiently while rising. In contrast, in the apparatus used in the claimed method, clusters of particles nearly broke up while rising through the prism-shaped intermediate section, so that the particles were uniformly dispersed in the fluidizing gas and then transferred to the lower portion of the riser.

This comparative experiment thus demonstrates that the use of the specific apparatus recited in the claimed method indeed provides results which are different from and would not be expected based on Molstedt, and also establishes the importance of the claimed intermediate cylindrical section. Since Molstedt only teaches an intermediate section containing three successive tapered sections having a truncated cone shape and does not suggest an intermediate section having an elevation angle of 85° or greater, one skilled in the art would not be motivated based on Molstedt to perform the claimed method using such a particular apparatus and to arrive at the present invention, which provides a sufficient decrease of the pressure change in the riser. The Fujiyama Declaration has thus rebutted the Examiner's assertion and thereby removed his basis for asserting that a *prima facie* case of obviousness exists with respect to Moldstedt. Accordingly, reconsideration and withdrawal of the § 102(b) and § 103(a) rejections are respectfully requested.

In view of the preceding amendment, remarks and Fujiyama Declaration, it is respectfully submitted that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

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WWS/SMK:rc
Enclosure – Petition for Extension of Time (one month)
Declaration Under 37 C.F.R. 1.132
Request for Continued Examination